Analysis and Report
of
Water Quality Data
and
SDRWQCB Tentative Orders
for El Morro Trailer Park

Submitted to

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Summary

This report describes the technical review and analysis conducted on existing data and records regarding the El Morro Mobile home Park (EMTP) wastewater disposal system, its potential impacts to surface and ground water, the Tentative Order (Order) issued by the Regional Water Quality Control Board, San Diego (SDRWQCB) for Waste Discharge Requirement (WDR), the Tentative Cease and Desist Order (CDO), and the Tentative Monitoring and Reporting Program (MRP) dated October 3, 2003.

The review and analysis addressed the following seven fundamental questions. In our best professional judgment, these questions should be addressed in a conclusive manner prior to preparing findings of fact sufficient to support the WDR, CDO & MRP.

1. *Does the treated wastewater from the EMTP disposal fields impact water quality in El Morro Creek?*

2. *Does the treated wastewater from the EMTP disposal fields impact water quality at El Morro Beach?*

3. *Is there evidence of groundwater in the vicinity of the EMTP wastewater disposal fields?*

4. *If there is evidence of groundwater, does the treated wastewater from the EMTP septic system impact groundwater quality?*

5. *Does the WDR from the SDRWQCB correctly state the impacts to groundwater and surface water quality from the EMTP wastewater treatment system?*

6. *Does the WDR from the SDRWQCB correctly establish discharge criteria and account for discharge options for both the East and West EMTP wastewater treatment systems?*

7. *Does the SDRWQCB sufficiently address the environmental impacts associated with wastewater discharge requirements?*

To answer these questions, the following written materials were examined in addition to miscellaneous documents on file with the SDRWQCB for this project:

a) State of California Department of Parks and Recreation Report entitled "Crystal Cove State Park Morro Creek Wastewater System Report", May, 2001, prepared by Psomas.

b) State of California Department of Parks and Recreation Report entitled "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile home Park Facility", September, 2002, prepared by Psomas.

c) Regional Water Quality Control Board, San Diego, "Water Quality Control Plan for the San Diego Basin".

d) Regional Water Quality Control Board, San Diego, Tentative Order No R9-2003-0228, Waste Discharge Requirements for California Department of Parks and Recreation Crystal Cove State Park, El Morro Mobile Home Park, Orange County.

e) County of Orange Health Care Agency/Environmental Health Bacteriological Monitoring Program-Newport Coast.

f) Heal the Bay's 'Beach Report Card'.

g) Records and internal communication reports supplied by Victor Vasquez, staff engineer for the SDRWQCB.

h) Records and communications regarding construction of a sewer lift station at El Morro Trailer Park (EMTP) by the California Department of Parks and Recreation.

The following are the fundamental conclusions of the review and analysis. More detailed conclusions are provided at the end of each section and at the end of the report.

1. Two reports were produced by Psomas, consultants to the California Department of Parks and Recreation (CDPR). These reports are the primary sources of data used to prepare the Order. A number of technical flaws and unsupported conclusions were identified in the studies.

2. The SDRWQCB staff appear to have misconstrued some of the water quality data presented in the Psomas reports, resulting in unsupported findings regarding erroneous both water quality and hydrogeological data.

3. In the Order, the SDRWQCB appear to have misinterpreted the appropriate water quality objectives as identified in the Water Quality Control Plan - San Diego Basin.

4. The Order neither provides appropriate discharge specifications for either the East or West EMTP wastewater treatment systems nor does it address the possibility of connecting to the sewer.

5. The Order does not address potential environmental impacts resulting from WDR prohibitions.

The Order is currently scheduled for approval during the November SDRWQC Board Meeting. We recommend that a formal request be made to SDRWQCB staff to postpone the approval and to revise the Order in light of the comments and recommendations herein. The balance of this report addresses each of the fundamental questions raised above and demonstrates how each of the five conclusions was derived.

1. Does treated wastewater from the EMTP disposal fields impact water quality in El Morro Creek?

Bacterial Impairment of El Morro Creek

Wastewater from the inland EMTP septic system is disposed through a series of subsurface seepage pits in two disposal fields approximately 0.30 miles northeast of the EMTP. Each of the disposal fields is approximately 300 feet east of El Morro Creek. El Morro Creek is predominantly dry in the upper reaches, although pooled water can be found in the uppermost portion of the creek. Approximately 300 ft downstream of the disposal fields, El Morro Creek experiences year-round flows.

2000 and 2001 Water Quality Investigations

CDPR conducted a series of investigations at El Morro Creek during summer of 2000 and spring of 2001. These tests were performed to define bacterial loadings in the creek and to determine whether degraded water quality was a consequence of the wastewater seepage pits. Results of these water quality tests were published in two reports issued by Psomas. Water samples were taken at 100 ft intervals along El Morro Creek, starting at the Pacific Coast Highway bridge and continuing up the creek for 1,300 feet. At this point, water 'daylights' into the creek. The creek is dry beyond about 1,500 feet from the bridge.

The Water Quality Control Plan, San Diego Basin, (Basin Plan) states "In waters designated for non-contact recreation (REC-2), the fecal coliform concentrations for any 30-day period, shall not exceed 2,000/100 ml no shall more than 10 percent of samples

collected during any 30-day period exceed 4,000/ml". The Basin Plan designates a REC-2 beneficial use to El Morro Creek. Examination of the summer 2001 water quality data shows a few areas of El Morro Creek that exceed water quality standards for fecal coliform, but these areas are predominantly in the lower reaches of the creek between the mouth of El Morro Creek and in the vicinity of the mobile home park. Water samples taken from the section of the creek near the disposal fields do not exceed water quality standards. In fact, the nearer the sampling locations are to the disposal fields, the *lower* the fecal coliform concentrations in the creek. A compilation of the water quality test results for fecal coliform are shown in Exhibit 1.

Directly downstream from the disposal fields, water in El Morro Creek meets the Basin Plan water quality objective for REC-2 waters. Water quality data taken during the spring 2001 sampling period emphasizes this trend; fecal coliform levels were very low in the water immediately downstream of the disposal fields. Precipitation reports from the Crystal Cove rain station show that during the spring sampling period, there was significant rainfall within 72-hours of the February and March sampling dates. Increased flows in the creek during wet weather sampling may account for the low fecal coliform concentrations along the entire stretch of the El Morro Creek, particularly the almost non detectable levels of fecal coliform in the water directly downstream of the disposal fields.

2002 Water Quality Investigations

The "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile home Park Facility" (Psomas, September 2002) reported water quality data during the months of March and June of 2002. Two samples were collected upstream of the

disposal fields at somewhat distant locations: EB1 about .8 miles upstream and EB2 about 1.6 miles upstream. Reportedly, these locations were the first points where adequate water for sampling was found because the reach was dry between EB1 and the creek bed below the disposal field where water daylights. Two samples were taken downstream of the disposal fields (EC1 and EC2). Exhibit 2 shows the location of the sampling points.

Fecal coliform. Upstream (background) water samples from El Morro Creek (EB1 and EB2) show low levels of fecal coliform, which is consistent with natural waters in undeveloped areas subject to fecal contamination from wildlife (fox, rabbit, squirrels, deer, etc.). Sample EC1, which was taken 300 feet downstream of the disposal fields where the creek first daylights, shows nearly non-detectable levels of fecal coliform in both the March and June samples. By contrast, sample EC2, taken even further downstream and just north of the mobile home park, shows significant levels of fecal coliform. The results of the water quality sampling by Psomas are shown in Table 22 of the Psomas report and are presented in Exhibit 3. These data are consistent with four samples tested in June 1999 (Natural Systems International, Inc., July 3, 2001). Fecal coliform in the creek at the source averaged 6.3 mpn for the four samples. Samples from the creek taken at PCH ranged from 240 mpn to 1,300 mpn. In November 2000, tests conducted by E.S. Babcock and Sons found fecal coliform at less than the detection limit (<200 mpn) at twenty feet from where the water first appears in the creek down stream from the seepage pits. Fecal coliform levels were 200 and 400 farther down stream at the County sampling point and at the mouth at the beach, respectively.

The County of Orange Health Care Agency's environmental health division is responsible for the dry weather monitoring of the coastline and creeks within its jurisdiction. Reports from the 2003 bacterial monitoring program for the Newport Coast were obtained from the County (provided by Monica Mazur, OCDEH). The County monitors the beach at the mouth of El Morro Creek as well as creek water at two locations (1) adjacent to the Pacific Coast Highway and (2) at a location just north of EMTP. See Exhibit 4.

Water quality monitoring results show excessive fecal contamination at the portion of the creek located next to the highway; however, fecal coliform concentrations are low in the creek water north of the mobile home park and conform to the water quality objectives for REC-2 waters. Fecal concentrations in water close to the highway is consistent with levels found in water that receives input from impervious surfaces, urban runoff, water fowl, and fecal matter from domesticated animals. The lack of significant levels of fecal coliform in the creek water north of EMTP indicates a lack of impact from the wastewater disposal fields. These data are consistent with data collected by the CDPR.

The "Crystal Cove State Park Morro Creek Wastewater System Report", May 2001, (pg 10, Psomas) renders a conclusion on the impact of water quality from the wastewater disposal fields. The report states "Cause of Morro Creek Pollution: It is the conclusion of this report that the cause of the positive bacteriological results is **not** due to the existing wastewater treatment system." Further, the "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile Home Park Facility," September, 2002, (pg 48, Psomas) renders a similar conclusion. "The collected data do **not** indicate that the constituents in the discharged effluent reach El Morro Creek and that bacteria detected in

El Morro Creek is not consistent with human waste disposal at the EMTP". Conclusions from both of these reports are consistent with the results of repeated water sampling by both the CDPR and the County of Orange Health Care Agency's environmental health division.

Impairment of El Morro Creek from Nitrate, MBAS, Boron, Iron, Manganese, Chloride, Sulfate, and Total Dissolved Solids

The CDPR sampled water from El Morro Creek during March and June of 2002 to determine if the water contained nitrate, MBAS, boron, chloride, manganese, sulfate and iron levels exceeding water quality objectives set forth in the Basin Plan for inland surface waters located in the San Juan Hydrologic Unit 901.00, Laguna Hydrologic Area 1.10. The water sampling locations are shown on Exhibit 3. These were the same sites as used for bacterial analysis. Results of the general minerals analysis are shown in Exhibit 5 and Exhibit 6 and are reported in the "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile home Park Facility," September, 2002 (Psomas).

Nitrate and nitrogen compounds. An overall assessment of the water quality data revealed that neither the section of El Morro Creek upstream or downstream of the disposal fields is impaired due to nitrate, nitrite, or ammonia.

MBAS. MBAS is an indication of wastewater surfactants. MBAS was present in samples from both the upstream and down stream portions of the creek. However, all MBAS concentrations were below the daily maximum and 12-month average water quality objectives as set forth in the Basin Plan.

Boron. Concentrations of boron exceeded Basin Plan water quality objectives for the background samples at EB1 and in both downstream samples.

Iron. Two sample sets were taken of water both at the control sites (EB1, EB2) and at two sites down gradient from the east wastewater disposal fields. One sample set was taken in March, during the "wet season" and the second sample was taken in June during the "dry season." Only one water sample per sample station was taken for analysis. The "wet season" samples showed that water both at the background site EB1 and at sites EC1 and EC2 exceeded the Basin Plan water quality objectives for iron. In the "wet weather" samples, all samples showed concentrations of iron that greatly exceeded Basin Plan standards.

Manganese. Manganese was above the water quality objective level in all downstream samples. Manganese was high in background samples collected at EB1 and EB2 during the June test phase.

Chloride, sulfate, and total dissolved solids. All water samples, both background and downstream, had levels of chloride, sulfate, and total dissolved solids (TDS) exceeding Basin Plan objectives.

Soil minerals. Concentration of metals and certain minerals in soil samples are summarized from lab reports (Psomas Table 13). Most metal and mineral concentrations are reported as non-detected using EPA test method 6010B (TCLP) for this analysis. This method detects hazardous metals by using an *acidic* leaching procedure. Given the geology of the area and the low rainfall climate, these soils would predictably be alkaline

with minerals such as boron and manganese leaching out under *alkaline* conditions (natural conditions). Use of the TCLP instead of agricultural tests appears inappropriate and potentially misleading for these common minerals that are a concern if the water were to be used for agricultural purposes.

Influence of Geology

High levels of chloride, sulfate, boron, iron, and manganese in El Morro Creek water is better understood by examining the natural mineral and metals content of the soils in the Laguna Hydrologic Area. Bedrock in this area consists of sedimentary rocks originally deposited in a marine environment (Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile home Park Facility", September, 2002, prepared by Psomas). Regional uplift brought the bedrock units to the surface where they have been extensively eroded. These units are locally capped by surficial deposits including alluvium, colluvium, marine and non-marine terrace deposits, landslide debris, beach sediments, and manmade fill. Locally mapped surficial geologic units in the immediate vicinity of EMTP include well-bedded siliceous shale, siltstone, and occasional sandstones of the Tertiary Monterey Formation, and siltstone facies of the Tertiary Capistrano Formation.

Boron is found in sediments and sedimentary rock, particularly clay rich marine sediments, such as those present in El Morro Canyon. Boron levels in soil are typically about 10 mg/kg in these types of soils. Natural ore deposits of iron- and manganese-bearing minerals yield these metals to groundwater and surface water when present in water-bearing soils (Northern Testing Labs, Fairbanks, AK). Sulfate is a natural

component of gypsum rock composed of calcium sulfate. Gypsum accumulation in soils is related to Quaternary deposits (glacis and terraces) of all ages. Gypsum is found in marine deposits such as those found in the San Joaquin Hills. In arid and semi-arid areas, gypsum is dissolved into groundwater in the wet season and tends to precipitate when the soil dries. High levels of chloride found in the surface water can be attributed to the dissolution of salts from the natural sediments found in the El Morro Canyon.

Conclusions. Existing water quality samples do not provide evidence that the wastewater disposal fields cause impacts from bacteria, nitrate, or nitrogen compounds to the water of El Morro Creek. MBAS concentrations are below water quality objectives.

Based on the lithology of the San Juan Hydrologic Unit and specific soil analyses (Psomas, 2002) of the El Morro Canyon, the source of boron, iron, manganese, chloride and sulfate in the surface water of El Morro Creek is lithologic, originating from the specific soil types found by the creek. While these metals and ions are present in concentrations that exceed Basin Plan water quality objectives, their source is naturally occurring and not related to the EMTP disposal fields. The "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile Home Park Facility", September 2002 (Psomas) offers the same conclusion, "....because of the reducing chemical environment other ions available in the sediments are likely being dissolved into the groundwater...the presence of the other listed parameters are likely the result of naturally occurring concentrations of these compounds" (pg 45-46).

2. *Does the treated wastewater from the EMTP disposal fields impact water quality at El Morro Beach?*

Although the "Crystal Cove State Park Morro Creek Wastewater System Report" or "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile Home Park Facility" do not address the issue of beach water quality at El Morro Beach, the County of Orange Health Care Agency does. The Agency's environmental health division conducts bacterial monitoring of El Morro Beach as part of its dry weather-monitoring program. Water from the beach area is sampled once per week during the dry season in accordance to the AB411 health regulations of the State of California. El Morro Beach consistently shows a lack of bacterial impairment from either fecal coliform or enterococcus. Exhibit 4 shows the results of the beach monitoring.

The non-governmental organization Heal the Bay routinely reports on the status of beach water quality within the Southern California region. Heal the Bay issues a "Beach Report Card" every year as well as an annual "State of the Beach" report. El Morro Beach has consistently received an 'A+' rating on the "Beach Report Card" for the last three years, and is one of the few beaches in the Southern California region that has achieved an 'A+' rating during wet weather. The "Beach Report Card" for El Morro Beach is shown in Exhibit 7.

Conclusion. The obvious conclusion from both the County of Orange beach monitoring data and the high beach quality rating given by Heal the Bay is that there is no impact to El Morro Beach from wastewater originating from *either* the East or West EMTP wastewater systems.

3. Is there evidence of groundwater near the EMTP wastewater disposal fields?

A few sources reported information on ground water at or near the EMTP disposal fields:

- Percolations tests were performed in February 1977 and October 1985 for the purpose of sizing seepage pits. Both test records reported absence of groundwater at depths of 24 and 29 feet (See Exhibit 8). Percolation rates were high -- 0.93 to 6.76 minutes per inch (mpi) indicating suitable soils for seepage pits.

- In the "Report of Sampling and Analysis for the Crystal Cove State Park El Morro Mobile home Park Facility," Psomas reports that groundwater underlying the EMTP is located in thin, shallow alluvium and colluvium soils. This is the only area that can store, transmit, and yield appreciable quantities of groundwater. That statement was presumably based on a referenced bulletin from the California Department of Water Resources (1972). The term "appreciable yield" was not quantified in the report. The report neither identified wells in the vicinity nor current uses of groundwater, if any, to indicate the yield, water quality, depth, location, or other groundwater characteristics.

- A communication (CDPR memorandum, May 2, 2003) from Richard Rozzelle, CDPR Technical Services Manager, to Victor Vasquez, SDRWQCB, states, "Drinking water for park facilities, El Morro Trailer Park and the surrounding areas is provided by either the Irvine Ranch Water Distract or the Laguna Beach County Water Distract. Neither of

these agencies utilizes ground water wells to provide drinking water to these facilities."

- In a telephone conversation record dated May 6, 2003 (Victor Vasquez, SDRWQCB), Rick Rozzelle of CDPR "clarified that the intent of his letter dated May 2, 2003 was to indicate that there are no drinking water wells in the Morro Canyon watershed."

Additional ground water data from Psomas

Psomas reported that the upper edge of this water-bearing zone was believed to be unconfined. For the benefit of the reader, we diverge to explain that for an unconfined, uppermost water-bearing zone, the elevation of naturally occurring groundwater may vary seasonally, if present. The water would not be held under pressure. Such a zone would be influenced by surface activities and conditions such as rainfall, evapotranspiration, root uptake, wastewater disposal, and irrigation.

It does not appear from the Psomas reports that this water-bearing zone has hydraulic connectivity with possible deep aquifers because of the underlying bedrock. Reportedly, bedrock is located at about 25- to 40-feet below ground surface. The bedrock consists of massive marine sediments that are not water bearing. The quality, quantity, and yield of possible aquifers below bedrock were not reported.

The absence of information in the Psomas report on other wells in the vicinity of EMTP could suggest an absence of nearby wells. By contrast, a report of extraction wells would suggest a usable yield of groundwater and a usable water quality.

Monitoring well locations. Psomas installed three monitoring wells, P-11 south of the northern disposal field, P-12 south of the southern disposal field, and P-13 in the vicinity of the western wastewater disposal field. The purpose of the wells was to collect background water quality data. Only well P11 is at an appreciable distance from a disposal field, about 150 feet southwest of the northern disposal field and a farther distance north of the southern disposal field.

Psomas collected water samples from eight monitoring wells in the eastern disposal fields area and tested the water for nitrate and other nitrogen compounds. Each well revealed nitrogen species that were subsequently mapped to show a single continuous plume of nitrogen compounds surrounding both disposal fields, including the area lying between the fields. See Exhibit 9. This suggests that all of the wells lie within a plume of wastewater effluent. This is not unexpected, given that the purpose of seepage pits is to allow the effluent to seep into the ground where the soil continues to treat the effluent. This is the common intention of all onsite wastewater systems that dispose of effluent into the ground. In other words, the seepage pits are working as intended. It is entirely possible that all of the water within the nitrogen plume is wastewater effluent.

Lack of evidence of naturally occurring ground water. In a personal communication to Victor Vasquez, SDRWQCB, Matt Souttere of CDPR states, "We understand that these locations (referring to wells P11 and P12) were determined with the assumption that groundwater flow parallels that course of Morro Canyon Creek. These monitoring wells are intended to monitor the impacts of the disposal fields discharge on groundwater downstream of the disposal fields. If flow direction is significantly different from the

assumed direction, proposed locations P-11 and P-12 may not provide adequate information."

It is clear from Psomas' field measurements of water surface elevations in wells that the water flows to the southwest. It is not clear that there is any contribution to the effluent plume from naturally-occurring sources. Psomas conducted a theoretical estimation of the contribution of naturally occurring ground water in the disposal fields area and down gradient. The estimation appears to be based on available literature such as rainfall data, topographic and geologic maps, and soils information. Psomas states generically that groundwater occurs in unconsolidated sediments (page 32) and from a variety of sources including naturally-occurring seepage from fractures in the bedrock that underlie the drainage; drainage of bank storage from unconsolidated alluvium, colluvium, terrace deposits, and landslide debris; infiltration of precipitation; and accumulation of precipitation as runoff (page 37). However, since there were no wells sampled outside of the influence of the seepage pits, there is no evidence that naturally-occurring ground water exists.

Conclusions. The ground water quality sampling characterized the effluent plume in the vicinity of the disposal fields. Without field measurements and water quality tests from wells located *outside* the effluent plume, it is not possible to measure the effect of the disposal fields on naturally-occurring groundwater. Available records do not provide data that substantiate the existence of groundwater in the vicinity of the EMTP disposal fields.

4. *If there is evidence of groundwater, does the treated wastewater from the EMTP septic system impact groundwater quality?*

Psomas tested twelve monitoring wells within the disposal fields and in nearby areas. Eight of the wells were sampled twice and laboratory analyses were conducted on metals, general minerals, indicator bacteria and miscellaneous other constituents such as surfactants.

Preparation of water samples. Water samples were not filtered prior to testing and control samples were not shown in the Psomas 2002 report. The presence of particulates in water samples can negatively impact the reliability of the results, such that trace metals and ions could appear higher than in properly prepared, filtered samples.

Source of minerals. Boron, iron, and manganese were present in all monitoring well samples, both in the assumed reference wells P11 and P12 and in all samples from within the boundary of the nitrogen plume. Groundwater from all monitoring wells was enriched with sulfate and chloride. High TDS concentrations were present in all samples. The presence of sulfate and high TDS in groundwater is consistent with groundwater in a sedimentary aquifer derived from marine sediments. As previously described in this report, the lithology of the El Morro Canyon can be expected to release boron, iron, manganese, chloride and sulfate into the groundwater through natural dissolution of the sediments. Although the Basin Plan objectives are exceeded for all but one sample collected in the Psomas study, this groundwater chemistry is indicative of the natural geochemistry, not indicative of impacts to naturally-occurring ground water by the disposal fields.

Constituents associated with wastewater. Groundwater from the twelve wells was analyzed for MBAS, nitrogen compounds, and indicator bacteria. Basin Plan water quality objectives for groundwater specifically target nitrate only, and thus, only this form of inorganic nitrogen is of concern when examining the potential for groundwater impacts from the disposal fields. Concentrations of nitrogen compounds detected in the disposal fields water are shown on Figure 12 of the Psomas report (see Exhibit 9). Tags on each sampled well shown on Figure 12 indicate concentrations of total nitrogen, nitrate, nitrite, and ammonia in mg/l. Waters designated for use as domestic or municipal supply (MUN), such as the San Joaquin Hills HSA, shall not contain concentrations of nitrate (as nitrate) in excess of 45 mg/l, as set forth in the California Code of Regulations, Title 22, Table 64431-A of Section 64431. The Basin Plan requires that groundwater contains a level of nitrate *as nitrogen*, no higher than 10 mg/l for the San Joaquin Hills HSA. Nitrate was not detected in any of the groundwater samples at a level higher than 10 mg/l except in well P8, which had 10 mg/l NO^3-N.

The presence of MBAS, which is an indicator for the presence of wastewater, was found in all groundwater samples, including samples taken from presumptive reference wells. Only well P6 had levels of MBAS in exceedance of the 0.5 mg/l Basin Plan Water Quality Objective for this compound.

Water quality investigations were reviewed for fecal coliform and enterococcus findings. Because a water quality objective is not set for total coliform in ground water, total coliform is not discussed in this review. The results of the bacteriological analysis of the groundwater monitoring wells showed that none of the wells had bacteria levels of fecal coliform in levels higher than 200 MPN/ml. One well, P11, showed a low level of fecal

coliform (90 MPN/ml) during the "wet season" sampling period and well P5 showed the same level of fecal coliform during the "dry season" sampling period. However, these levels of fecal coliform are not outside the water quality objectives for groundwater associated with wastewater disposal.

Conclusions. The levels of TDS, minerals and sulfate found in groundwater samples taken within the vicinity of the wastewater disposal fields are consistent for water influenced by the natural geochemistry of El Morro Canyon and would not be considered impacted by the wastewater disposal fields. Nitrate levels in all the groundwater samples were within the limits set by the Basin Plan for groundwater designated as MUN, and only one sample was suspected to have levels of MBAS that exceeded Basin Plan objectives. Thus, there is no impact to the groundwater associated with the wastewater originating from *either* the East or West EMTP wastewater systems.

5. *Does the WDR from the SDRWQCB correctly state the impacts to groundwater and surface water quality from the EMTP wastewater system?*

The SDRWQCB issued Tentative Cease and Desist Order (CDO) No. R9-2003-0285 to comply with the pending WDR Order No. R9-2003-0228. The CDO contains a Time Schedule in which the EMTP must cease assumed violations of effluent limitations and waste discharge requirements by September 10, 2005.

Insufficiency of Information. WDR Finding 1 states that "sufficient information had been submitted as part of the RWD to prepare tentative Waste Discharge Requirements." This analysis demonstrates that insufficient information was presented to the SDRWQCB staff for adequate assessment of potential water quality impacts from effluent disposal. Information submitted by the CDPR does not provide sufficient evidence that groundwater is present, nor does it sufficiently address the influence of local lithology on metals and ions in subsurface waters. The information lacks discussion of the potential for natural attenuation of total nitrogen and nitrates found in the wastewater.

Nitrate and Nitrogen. CDO Finding 2 states that typical septic tank effluent contains total nitrogen of 40-50 mg/L as N and assumes that this textbook-reported nitrogen concentration is also typical of the EMTP wastewater. Actual wastewater quality testing by Psomas showed that both the BOD and TSS of this wastewater were below the average textbook reported concentrations for BOD and TSS, with the BOD reported as an average of 138 mg/l and TSS reported as an average of 24 mg/l (Psomas 2002, pg 14). Thus, it is probable that the total nitrogen and nitrate contained in the EMTP septic tank effluent is also lower than textbook reported concentrations. The EMTP septic effluent

needs to be properly evaluated for its actual average concentration of nitrate before conclusions are made that the effluent will exceed waste discharge limitations for nitrate. The EMTP wastewater effluent should be tested for nitrate and other nitrogen compounds.

Finding 2 further states that the assumed concentration of total nitrogen in the septic effluent would exceed both water quality objectives and drinking water standards yet water quality objectives for groundwater and drinking water are set for nitrate and nitrite, not total nitrogen. Before the wastewater effluent could cause an exceedance of water quality objectives and drinking water standards, the effluent must first be disposed in the existing disposal fields. During percolation through the soil and transport in the subsurface, various biological, physical, and chemical processes occur, removing nitrogen as nitrogen gas and converting nitrogen to inorganic forms such as nitrate and nitrite. The production of nitrate and nitrite depends on the soil type, adsorptive capacity of the soil, presence of nitrifying and denitrifying bacteria, and the oxidation-reduction potential of the subsurface regime. It is not valid to assume that nitrate levels from the EMTP septic effluent would exceed water quality objectives **and drinking water standards** without properly assessing these factors.

Evidence of naturally occurring groundwater. WDR Finding 10 states that "the total nitrogen and ammonia content of septic tank effluent *may* convert to nitrates once discharged to subsurface disposal systems." This assumption conflicts with Finding 2 of the CDO, where it is the total nitrogen contained in the septic effluent that has potential to cause water quality exceedances. Both of these findings conflict with the Basin Plan

water quality objectives for surface water and groundwater, which are based on nitrates and nitrite concentrations, not total nitrogen.

Finding 18. WDR Finding 12 states that there are groundwater monitoring wells located in the vicinity of the EMTP effluent disposal areas. There is no evidence presented in the technical reports by Psomas or in other project documentation to support the conclusion that naturally-occurring ground water is present. Water found in all monitoring wells appears to be mounded effluent from the disposal fields perched atop bedrock and isolated from potential naturally-occurring water in the area of the disposal fields.

The language in WDR Finding 18 is confusing and appears contradictory. As previously stated in this report, the Psomas fieldwork did not adequately establish sufficient findings to support the conclusion that groundwater is present in the area surrounding the EMTP disposal fields. Thus, the statement that "The wastewater discharge from EMTP may be causing the groundwater in the vicinity of the disposal areas to exceed the Basin Plan water quality objectives." is not supported by the facts. In addition, Finding 18 states that wastewater may be causing exceedances in drinking water standards. Data collected on water found in monitoring wells in and near the wastewater disposal fields shows that nitrate levels for drinking water <u>are not</u> exceeded (see Exhibit 9). We recommend that Finding 18 be corrected to reflect data contained in the RWD or deleted in its entirety. The statement "municipal and domestic supply beneficial uses of the groundwater in the eastern portion of EMTP are likely to be attainable outside of the immediate vicinity of the disposal areas" is perplexing. Water quality data from the Psomas report used to prepare the RWD shows that water found in four of the monitoring inside the area of the

disposal fields meets both drinking water and groundwater standards for nitrate; while one supposed groundwater reference well outside of the disposal area did not. Not only is there lack of supportive data to show why the statement is made that water quality objectives are likely to be attainable outside the area of the disposal fields, but the fact that four wells inside the area of the disposal fields do meet the total nitrogen water quality objectives for groundwater and drinking water is not addressed. This element of Finding 18 requires clarification or deletion. Finding 18 appears to correctly state that there are no users of groundwater in the Morro Canyon watershed and there is no evidence to support a future intention to use groundwater in the Morro Canyon for the potable purposes. This issue highlights a more serious concern of the application of municipal and domestic supply beneficial uses to water that has no past history, present use, or future intent as a source of water for municipal or agricultural usage, and which might not be present.

Finding 22. WDR Finding 22 states that the SDRWQCB considered the assimilative capacity of the soil and groundwater to develop effluent limitations. This statement contradicts CDO Finding 2 that the level of total nitrogen contained in the septic tank effluent would exceed total nitrogen limitations of the WDR, implying that the wastewater effluent, not effluent from the disposal fields that has undergone physical, chemical, and biological conversion and degradation, is causing water quality exceedances. If the assimilative capacity of the soil and groundwater were considered, evidence to support this statement should be provided. In addition, information that supports the denitrification activities of the soil and groundwater for its ability to remove nitrate should be examined. Otherwise, Finding 22 should be deleted.

Finding 23. WDR Finding 23 states that other waste discharges were considered when establishing the requirements of the EMTP WDR. It would be instructive to the reviewers of the EMTP WDR to receive copies of other waste discharge requirements that require effluent limits to meet Basin Plan water quality objectives for groundwater, particularly for mineral constituents. Our knowledge of discharge requirements set in other WDRs for onsite systems treating domestic wastewater suggest that discharge limits are typically set for conventional wastewater parameters such as flow, biochemical oxygen demand (BOD), total suspended solids (TSS), pH, temperature, dissolved oxygen (DO), bacteria, and possibly nitrates. WDR Finding 23 should be supported by appropriate technical references or deleted.

Finding 23 states that past, present, and probably future beneficial uses of the hydrologic subunit were considered in establishing the EMTP WDR. There are currently no reported past and present beneficial uses of the groundwater in El Morro Canyon. It is not clear that there are any plans for use of groundwater from El Morro Canyon. Indeed, there is no evidence that groundwater exists in that reach of El Morro Canyon. WDR Finding 23 should thus be supported by appropriate references or deleted.

Conclusions. An evaluation of the nitrogen or nitrate concentrations in the wastewater prior to disposal was not performed to substantiate the claim that wastewater from the EMTP septic tank presents a potential to cause exceedances of water quality objectives for ground and surface water. In fact, data from the Psomas 2002 report shows that groundwater found in and near the wastewater disposal areas <u>is not</u> contaminated with nitrate. Both the CDO and WDR make continual reference to the total nitrogen content of the wastewater, as opposed to the nitrate concentration (which would be in accordance

with both CCR Title 22 and the Basin Plan). Insufficient evidence was presented by the CDPR as to the evidence of groundwater in the El Morro Canyon. Insufficient data was supplied to support that other WDRs were considered when establishing the requirements that EMTP wastewater meet groundwater standards. Information was not presented to establish past, present, future beneficial uses of groundwater (if present) in El Morro Canyon.

6. *Does the WDR from the SDRWQCB correctly establish discharge criteria and account for discharge options for both the East and West EMTP wastewater systems?*

Of primary importance in the discharge requirements set by the Order is the requirement that treated wastewater obtain groundwater water quality objectives. Ground water objectives are not typically applied in the manner applied in this Order. Having reviewed a number of WDRs, it is our best professional judgment that this WDR is unique and not typical of WDRs, particularly for onsite wastewater systems. Typically, WDRs for wastewater have discharge limits that address primary onsite wastewater characteristics and constituents: flow, BOD, TSS, pH, temperature, total coliform and fecal coliform, and possibly e. coli or enterococcus, nitrates and DO.

Flows. The average dry weather daily flow is reported in the Findings (page 3) as 42,570 gpd for the East EMTP. The average daily wet weather flow is identified as 51,084 gpd. In the Prohibitions (Prohibition 8, page 7), the discharge is prohibited to exceed 42,600 gpd in dry weather and 51,000 gpd in wet weather. A conventional prohibition or flow discharge limit would specify monthly average flows, recognizing the variability and inevitability of peak flows exceeding the averages. The limits set for the monthly averages should be set at least as high as the current averages for both dry and wet flows. Prohibitions for flows from the West EMTP should also conform to this approach.

For discharges through subsurface disposal systems, the most common discharge limits are for flow, BOD and TSS and possibly nitrate and bacteria. Limits for metals and ions are not typically applied to domestic wastewater discharges nor do typical monitoring programs require monitoring of these compounds.

Furthermore, discharge limits set to comply with water quality objectives are typically set for *monthly averages*, not for a daily maximum. It is recognized by regulatory agencies that daily maximums will produce excursions over the monthly average. For example, a POTW with a discharge to surface waters will typically have to adhere to the Clean Water Act (CWA) which requires a monthly average discharge limit of 30 mg/L for BOD and 30 mg/L TSS. The "30-30" limit adheres to the 95% confidence interval defined by the CWA. The Daily Maximum Limits are typically on the order of 45 mg/L each.

Methodology for setting limits. Regarding the numerical discharge limits, calculations used by SDRWQCB to develop the limits (Vasquez, August 4, 8, and 12, 2003) apply a risk-based approach for acute and chronic risk. A risk-based approach is appropriate when treated effluent is directly discharged to surface waters, causing a potential risk of exposure (e.g., to aquatic life). In this case, the discharge is to the subsurface, having no direct risk of exposure and where attenuation of constituent concentrations occurs from natural subsurface processes. Further, "[i]n the absence of actual effluent analysis data, Waste Load Allocations (WLA) were set equal to the ground water quality objectives." Except for BOD and TSS, effluent water quality data were not found by the authors despite a review of all available records. The setting of discharge limits for unconventional constituents without a reasonable basis for their presence in the effluent is perplexing, as are the lack of effluent quality data, and the substitution of ground water quality objectives for effluent data.

It appears that application of this method may contribute to setting nitrate limits below limits required by Title 22.

We note inconsistency in referencing nitrate limits and wish to draw attention to inconsistency within the Basin Plan itself. The nitrate limit in ground water is 45 mg/L nitrate (as NO_3) as stated in Table 3-4, Maximum Contaminant Levels for Inorganic Chemicals Specified in Table 64431-A of Section 64431 of Title 22 of the California Code of Regulations as Amended January 3, 1995 and repeated in the discussion of nitrate on page 3-10, "the primary drinking water standard for nitrate as NO_3 is 45 mg/L." The limit of 45 mg/L NO_3 (as NO_3) is the same chemically as 10 mg/L of NO_3 (as N). Contradictory to Title 22, Table 3-3, Water Quality Objectives sets a nitrate limit of 10 mg/L NO_3 (as NO_3).[1] This concentration would be correct if stated as 10 mg/L NO3 (as N). Herein lies a source of confusion and perhaps an inadvertent requirement for a more stringent discharge limit than required by law. Setting a more stringent limit must be based on findings of fact. The reasons why a more stringent limit is set must be provided or the scientifically-correct limit of 45 mg/L NO_3 (as NO_3) or 10 mg/L NO_3 (as N) should be used.

Treated effluent that is discharged for final dispersal through disposal fields percolates through the soil and may become mounded at a soil depth determined by subsurface conditions, such as the bedrock underlying the El Morro Canyon. Perched water is influenced by surface activities and conditions such as rainfall, evapotranspiration, irrigation, root uptake, bacterial contamination from natural sources (undomesticated animals), etc. Given the tendency for perched water to be of lesser quality than water found in deep aquifers, perched water is generally not used as a source of municipal or domesticated supply water.

[1] Now is an opportune time for the SDRWQCB to make appropriate corrections to conform the Basin Plan to Title 22 for NO_3 limits, given the triennial review of the Basin Plan this year.

It is difficult to conceive that requiring the EMTP effluent to meet Basin Plan water quality objectives for groundwater is appropriate when perched groundwater in the area of El Morro Canyon, if present at all, would probably not meet Basin Plan objectives (Exhibit 10). Of equal concern is the attempt to apply groundwater standards to wastewater, such that if the disposed wastewater were to meet these groundwater standards, the wastewater would be of an acceptable water quality for use as municipal and domestic water supply. It is assumed that the SDRWQCB does not intend to allow treated wastewater to be classified and used as groundwater suitable for potable uses, as this would be in direct conflict to the California Code of Regulations as related to the legal uses of treated wastewater.

Nitrate. The WDR discharge specifications require that the EMTP wastewater contain no more than 7.0 mg/l of total nitrogen (as N) as a daily maximum and no more than 3.9 mg/l of total nitrogen on a 12-month average. The Basin Plan water quality standards for both groundwater and drinking water are based on a water quality objective set for nitrate, not total nitrogen. Thus, the discharge requirement for total nitrogen, as stated in the Order, is in conflict with the Basin Plan and unsupported by regulating authority.

Discharge Options. EMTP lies adjacent to the DPR office and a school, both of which are connecting to sewer by means of installing sewage lift stations and a sewer pipeline. By relatively simple changes to the onsite sewer system, EMTP could also connect to the sewer without significant impacts to potential archaeological articles possibly located under ground. It has always been our experience that the submission of an administratively complete Report of Waste Discharge must consider the feasibility of discharging to the existing domestic sewer. Here, this option was never even mentioned, much less evaluated.

West EMTP. In addition, the West EMTP wastewater treatment system is *exempt* from both municipal and domestic supply beneficial uses. Neither total nitrogen nor nitrate standards apply to the West wastewater system. Finding 16 of the WDR gives the groundwater quality objectives for the San Joaquin Hills HSA, but includes both the East and West EMTP wastewater systems. In addition, the WDR discharge specifications seem to apply for both the East and West EMTP wastewater systems, and does not distinguish that the West system is exempt from any water quality standards related to nitrate or nitrogen. Discharge requirements need to be changed such that Basin Plan water quality objectives are appropriately applied to the West wastewater treatment system.

Monitoring. The Effluent Monitoring Program requires quarterly analysis for BOD and TSS. Numeric criteria for BOD and TSS were not established in the discharge requirements nor are they established as water quality objectives for groundwater in the San Joaquin Hills HSA. The Groundwater Monitoring Program requires that groundwater from supposed reference monitoring wells P11, P12, and P13 be analyzed on a quarterly basis for total coliform, fecal coliform, and enterococcus. The WDR discharge specifications do not give a daily maximum or 12-month average limit for bacteria and numeric criteria are not provided in the Basin Plan as water quality objectives for groundwater. It is not clear how the results for these analyses will be used if WDR discharge specifications and water quality objectives for these parameters (for groundwater) are not established.

The Surface Water Monitoring program requires that surface water from El Morro Creek be collected at a point where water upstream of the upper disposal field first appears. The Psomas report clearly shows that in dry weather, the first water available in the creek is at a considerable

distance from the disposal fields and is not accessible for routine monitoring. Furthermore, the Surface Water Monitoring program requires that the water from El Morro Creek be analyzed for total nitrogen. The Basin Plan does that have numeric criteria for total nitrogen for inland surface waters.

Conclusions. A risk-based approach used for surface water discharges is incorrectly applied to subsurface discharge conditions. The discharge limits are unreasonably and unconventionally applied as daily maximums instead of monthly averages. The WDR does not take into account the option for using the sewer system currently under construction for the adjacent school and DPR office. The WDR sets discharge requirements for the East and West EMTP wastewater treatment systems based on groundwater objectives for the San Joaquin Hills HSA. Not only do the WDR discharge requirements not distinguish between the East and West treatment systems in terms of appropriate discharge requirements, but also the discharge requirement for total nitrogen in is conflict with CCR Title 22 and the Basin Plan, which contains requirements for nitrate concentrations in drinking water and groundwater. Furthermore, the entirety of the discharge requirements appears to be inappropriate for the regulation of wastewater discharges. Monitoring requirements revert to the standard objectives set for wastewater discharge, but are not contain in the WDR discharge specifications.

7. *Does the WDR from the SDRWQCB sufficiently address the environmental impacts associated with the Waste discharge Requirements?*

WDR prohibition 4 states that the discharge of waste in a manner causing flow, ponding, or surfacing on lands not owned by the discharger is prohibited. A water budget performed by Psomas indicated that the majority of water found in El Morro Creek is related to the discharge of wastewater from the EMTP disposal fields. Although the disposal fields do not directly discharge water to El Morro Creek, the consequence of incidental flows to the creek has been the development of a biodiverse and predominantly native ecosystem that is dependent on water from El Morro Creek. El Morro Creek discharges to the Pacific Ocean within the southern portion of the Irvine Coast Marine Life Refuge Area of Specific Biological Significance. Removal of water from El Morro Creek potentially impacts the established wetland; thus, there should be a thorough study made of the potential environmental impacts that would occur because of WDR Prohibition 7. Neither the Psomas reports nor the SDRWQCB provide information on the existing habitat in the area of El Morro Creek or have discussed the water resources-related environmental factors associated with the proposed discharge requirements. Additionally, Prohibition 3 will require an upgrade with potential impacts from construction of flood control measures. However, WDR Finding 24 concludes that the project is exempt from CEQA. Before Tentative Order No. R9-2003-0228 is adopted, sufficient evidence should be provided to demonstrate that that the results of the prohibitions contained in the WDR do not cause significant environmental impact warranting mitigation. Alternatively, WDR Finding 24 should be revised.

Conclusions. Environmental impacts could affect the downstream portion of El Morro Creek from upgrades to the existing treatment system, particularly if flood protection requirements are applied retroactively.

Final Conclusions

The authors of this report have arrived at the following major conclusions in addition to the conclusions stated at the end of each report section:

(1) There is no evidence that the treated waste water from either the eastern or western EMTP disposal fields have had any impact on water quality in El Morro Creek.

(2) There is no evidence that either the treated wastewater from the East or West EMTP disposal fields have had any impact on water quality at El Morro Beach.

(3) The report of waste discharge prepared by CDPR provides no credible evidence of ground water in the vicinity of the western EMTP waste water disposal field.

(4) Ground water in the vicinity of the East EMTP disposal field has no beneficial use.

(5) The Report of Waste Discharge prepared by CDPR provides no credible information to substantiate that the treated waste water from the EMTP septic systems impacts ground water quality.

(6) Many of the WDR findings lack technical support and are insufficient to correctly state the impacts to ground water and surface water quality from the East and West EMTP wastewater treatment systems.

(7) The WDR as written is vague and ambiguous concerning which of the EMTP waste water treatment systems is to be regulated.

(8) Many of the WDR findings establishing the discharge criteria appear to be incorrect and require significant revision.

(9) The methodology used to set discharge limits for treated wastewater is inappropriate for subsurface discharges

(10) The WDR characterizes the proposed project as the permitting of an existing sewage facility and therefore exempt from the California Environmental Quality Act (CEQA) as provided by Section 15301, and in compliance with Section 15300.2, of the California Code of Regulations Title 14. In fact the discharge prohibitions established by the WDR could have significant environmental impacts which have not been studied.

Recommendations. Based on the technical deficiencies identified above, the authors recommend that SDRWQCB staff withdraw proposed WDR Order R9-2003-2008. Further, tentative Cease and Desist Order no. R9-2003-0285 should be revised in light of the deficiencies of the report of waste discharge as follows:

(1) The Order should require that a technically adequate report of waste discharge be prepared and submitted to the SDRWQCB no later than six months after issuance of this order.

(2) Based on a technically adequate report of waste discharge, the SDRWQCB staff will prepare a report of waste discharge requirements within 90 days.

(3) The waste discharge requirements so prepared will be implemented by CDPR within 12 months of their approval by SDRWQCB.